

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (currently amended) An interbody spinal implant for insertion between adjacent vertebral bodies of a human spine, said implant comprising:

a leading end for introduction of said spinal implant into the spine, an opposite trailing end, and spaced apart sides therebetween, and a mid-longitudinal axis passing through said leading and trailing ends;

opposite upper and lower surfaces between said leading and trailing ends and said spaced apart sides, said upper surface adapted for placement in engagement with the bone of one of the vertebral bodies and said opposite lower surface adapted for placement in engagement with the bone of the other of the vertebral bodies when said implant is placed between the adjacent vertebral bodies; and

S10 a plurality of surface projections ~~bone-engaging structures~~ formed on said upper and lower surfaces of said implant, ~~each of said bone-engaging structures having a base, at least two of said bone-engaging structures each comprising at least a first and a second of said~~ surface projections each projection having at least one forward facing facet directed at least in part toward said leading end and at least one rearward facet directed at least in part toward said trailing end, each of said forward facet and rearward facet having a length and a slope, the length of said forward facet being longer than the length of said rearward facet, the slope of said rearward facet being steeper than the slope of said forward facet, at least a portion of said rearward facet of said first surface projection overlying a portion of said forward facet of said second surface projection ~~said surface projection having opposed side facets extending from said base and being directed generally toward said spaced apart sides of said implant, respectively, said side facets located between said forward facet and said rearward facet of said surface projection, said side facets converging toward each other in a~~

~~direction away from said base, said side facets having a maximum width therebetween at said base, said base being spaced apart from a base of another of said bone engaging structures by a distance no greater than one half the maximum width of said surface projection, said forward facets of said at least two of said bone engaging structures facing the same direction.~~

Claim 2 (cancelled).

3. (original) The spinal implant of claim 1, wherein said rearward facet is at an angle to at least one of said upper and lower surfaces of said implant.

Claim 4 (cancelled).

5. (original) The spinal implant of claim 3, wherein said angle is greater than 90 degrees.

Claims 6-18 (cancelled).

19. (currently amended) The spinal implant of claim 1, wherein said surface projections~~bone engaging structures~~ are oriented relative to one another to form an array.

20. (currently amended) The spinal implant of claim 1, wherein said surface projections~~bone engaging structures~~ are geometrically disposed relative to one another.

21. (original) The spinal implant of claim 1, wherein said upper and lower surfaces of said implant are at least in part arcuate.

22. (original) The spinal implant of claim 1, wherein at least one of said leading end, trailing end, and sides are curved.

23. (original) The spinal implant of claim 1, wherein said sides are curved.

24. (original) The spinal implant of claim 1, wherein each of said leading end, trailing end, and sides are curved.

25. (original) The spinal implant of claim 24, wherein said leading end, trailing end, and sides form a circle.

26. (original) The spinal implant of claim 1, wherein said upper and lower surfaces of said implant are at least in part planar.

27. (currently amended) The spinal implant of claim 1, wherein said upper and lower surfaces converge toward each other along at least a portion of the length of said implant.
28. (original) The spinal implant of claim 1, wherein said implant comprises a material other than bone.
29. (original) The spinal implant of claim 1, wherein said implant comprises bone.
30. (original) The spinal implant of claim 29, wherein said bone includes cortical bone.
31. (original) The spinal implant of claim 1, wherein said implant comprises bone growth promoting material.
32. (previously presented) The spinal implant of claim 31, wherein said bone growth promoting material is one of bone morphogenetic protein, hydroxyapatite, and genes coding for the production of bone.
33. (original) The spinal implant of claim 1, wherein said implant is treated with a bone growth promoting substance.
34. (original) The spinal implant of claim 1, wherein said implant is a source of osteogenesis.
35. (original) The spinal implant of claim 1, wherein said implant is at least in part bioabsorbable.
36. (original) The spinal implant of claim 1, wherein said implant comprises metal.
37. (original) The spinal implant of claim 36, wherein said metal is ASTM material suitable for use as a spinal fusion implant.
38. (original) The implant of claim 36, wherein said metal includes titanium.
39. (original) The implant of claim 1, wherein said implant comprises a plastic material.
40. (original) The implant of claim 1, wherein said implant comprises a ceramic material.
41. (original) The implant of claim 1, wherein said implant is formed of a porous material.

42. (original) The implant of claim 1, wherein said implant is formed of a material that intrinsically participates in the growth of bone from one of the adjacent vertebral bodies to the other of the adjacent vertebral bodies.
43. (original) The spinal implant of claim 1, wherein said implant is a motion preserving device adapted to space apart and allow motion between the adjacent vertebral bodies.
44. (original) The spinal implant of claim 1, wherein said spinal implant is a fusion implant.
45. (currently amended) The spinal implant of claim 44, wherein said upper and lower surfaces include at least one opening to permit bone growth from ~~one of the adjacent vertebral bodybodies to the other one of the adjacent vertebral bodybodies~~ through said implant.
46. (original) The spinal implant of claim 44, wherein said implant has an internal chamber and an access opening for accessing said internal chamber.
47. (original) The spinal implant of claim 46, wherein said implant has a cap for closing said access opening.
48. (currently amended) The spinal implant of claim 46, wherein said upper and lower surfaces include at least one opening in communication with said internal chamber to permit bone growth from ~~one of the adjacent vertebral bodybodies to the other one of the adjacent vertebral bodybodies~~ through said implant.
49. (original) The spinal implant of claim 46, wherein said internal chamber is capable of containing bone growth promoting material.
50. (previously presented) The spinal implant of claim 49, wherein said bone growth promoting material is one of bone morphogenetic protein, hydroxyapatite, and genes coding for the production of bone.
51. (original) The spinal implant of claim 1, further comprising at least one opening capable of retaining fusion promoting materials.
52. (withdrawn) The spinal implant of claim 1, further comprising at least one cut cleaving said surface projection into at least two portions.

53. (withdrawn) The spinal implant of claim 52, further comprising at least a second cut cleaving said surface projection into at least four portions.

54. (withdrawn) The spinal implant of claim 52, where said cut penetrates said surface projection at a depth substantially equal to that of the height of said surface projection.

55. (withdrawn) The spinal implant of claim 53, where said second cut penetrates said surface projection at a depth substantially equal to that of the height of said surface projection.

56. (withdrawn) The spinal implant of claim 52, wherein said cut is oriented along one of the ~~mid-longitudinal~~ longitudinal axis of said implant, an axis perpendicular to the ~~mid-longitudinal~~ longitudinal axis of said implant, and an axis at an angle between the ~~mid-longitudinal~~ longitudinal axis and the axis perpendicular to the ~~mid-longitudinal~~ longitudinal axis of said implant.

Claims 57-130 (cancelled).

131. (currently amended) An interbody spinal implant for insertion between adjacent vertebral bodies of a human spine, said implant comprising:

a leading end, an opposite trailing end, ~~and spaced apart opposite sides therebetween,~~ a mid-longitudinal axis passing through said leading and trailing ends, and right and left sides between said leading and trailing ends, said right and left sides being spaced apart on opposite sides of the mid-longitudinal axis and;

opposite upper and lower surfaces between said leading and trailing ends and said ~~spaced apart opposite right and left sides,~~ said upper surface adapted for placement in engagement with the bone of one of the vertebral bodies and said opposite lower surface adapted for placement in engagement with the bone of the other of the vertebral bodies when said implant is placed between the adjacent vertebral bodies; and

a plurality of ~~surface projections~~ bone-engaging structures formed on said upper and lower surfaces of said implant, each of said surface projections having a plurality of facets, each of said facets having a perimeter defining each facet, ~~at least two of said bone-engaging structures each comprising at least a first and a second of said~~

surface projections each projection having at least one right forward-facing facet directed at least in part toward said right side ~~one of said spaced apart opposite sides~~ and at least one rearward left facet directed at least in part toward said left side ~~the other one of said spaced apart opposite sides~~, each of said right and left facets ~~forward facet and rearward facet~~ having a length and a slope, the length of said forward right facet being longer than the length of said rearward left facet, the slope of said rearward left facet being steeper than the slope of said forward right facet, said first and second surface projections having at least one facet with the perimeter of said at least one facet having at least a first and a second portion arranged to form an included angle greater than 90 degrees between said first and second portions of the perimeter ~~said at least one surface projection having opposed side facets directed generally toward said leading and trailing ends, respectively, said side facets located between said forward facet and said rearward facet of said surface projection, said side facets converging toward each other in a direction away from the base of said projection, said forward facets of said at least two of said bone engaging structures facing the same direction.~~

Claim 132 (cancelled).

133. (currently amended) The spinal implant of claim 131, wherein said rearward left facet is at an angle to at least one of said upper and lower surfaces of said implant.

Claim 134 (cancelled).

135. (original) The spinal implant of claim 133, wherein said angle is greater than 90 degrees.

Claim 136 (cancelled).

137. (currently amended) The spinal implant of claim 131 ~~1424~~, wherein said projections are oriented relative to one another to form an array.

138. (original) The spinal implant of claim 131, wherein said projections are geometrically disposed relative to one another.

139. (original) The spinal implant of claim 131, wherein said upper and lower surfaces of said implant are at least in part arcuate.

140. (original) The spinal implant of claim 131, wherein said upper and lower surfaces of said implant are at least in part planar.

141. (currently amended) The spinal implant of claim 131, wherein said upper and lower surfaces converge toward each other along at least a portion of the length of said implant.

142. (original) The spinal implant of claim 131, wherein said implant comprises bone growth promoting material.

143. (previously presented) The spinal implant of claim 142, wherein said bone growth promoting material is one of bone morphogenetic protein, hydroxyapatite, and genes coding for the production of bone.

144. (original) The spinal implant of claim 131, wherein said implant is a motion preserving device adapted to space apart and allow motion between the adjacent vertebral bodies.

145. (original) The spinal implant of claim 131, wherein said spinal implant is a fusion implant.

Claims 146-202 (cancelled).

203. (previously presented) The spinal implant of claim 1, in combination with a fusion promoting substance.

204. (previously presented) The spinal implant of claim 203, wherein said fusion promoting substance includes at least one of bone, bone morphogenetic protein, hydroxyapatite, and genes coding for the production of bone.

205. (previously presented) The spinal implant of claim 131, in combination with a fusion promoting substance.

206. (previously presented) The spinal implant of claim 205, wherein said fusion promoting substance includes at least one of bone, bone morphogenetic protein, hydroxyapatite, and genes coding for the production of bone.

207. (currently amended) The spinal implant of claim 1, wherein each of said first and second surface projections have a base that is~~said bases of at least two of said bone engaging structures are adjacent to~~ one another.

208. (currently amended) The spinal implant of claim 1, wherein each of said first and second surface projections have a base, said bases being~~said implant has a longitudinal axis and said bases of at least two adjacent bone engaging structures are~~

spaced apart from one another along a direction generally parallel to the mid-longitudinal~~longitudinal~~ axis of said implant.

209. (currently amended) The spinal implant of claim 1, wherein each of said first and second surface projections have a base, said bases being~~said implant has a longitudinal axis and said bases of at least two adjacent bone engaging structures are~~ spaced apart from one another along a direction generally transverse to the mid-longitudinal~~longitudinal~~ axis of said implant.

Claims 210-212 (cancelled).

213. (currently amended) The spinal implant of claim 131, wherein each of said first and second surface projections have a base, said bases being~~the bases of at least two of said bone engaging structures are adjacent to~~ one another.

214. (currently amended) The spinal implant of claim 131, wherein each of said first and second surface projections have a base, said bases being~~said implant has a longitudinal axis and the bases of at least two adjacent bone engaging structures are~~ spaced apart from one another along a direction generally parallel to the mid-longitudinal~~longitudinal~~ axis of said implant.

215. (currently amended) The spinal implant of claim 131, wherein each of said first and second surface projections have a base, said bases being~~said implant has a longitudinal axis and the bases of at least two adjacent bone engaging structures are~~ spaced apart from one another along a direction generally transverse to the mid-longitudinal~~longitudinal~~ axis of said implant.

Claims 216-218 (cancelled).

219. (currently amended) An interbody spinal implant for insertion between adjacent vertebral bodies of a human spine, said implant comprising:

a leading end for introduction of said spinal implant into the spine, an opposite trailing end, and spaced apart sides therebetween, and a mid-longitudinal axis passing through said leading and trailing ends;

opposite upper and lower surfaces between said leading and trailing ends and said spaced apart sides, said upper surface adapted for placement in engagement with the bone of one of the vertebral bodies and said opposite lower surface adapted for

placement in engagement with the bone of the other of the vertebral bodies when said implant is placed between the adjacent vertebral bodies; and

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a plurality of surface projections ~~bone-engaging structures~~ formed on said upper and lower surfaces of said implant, at least a first and a second of said ~~bone of said bone~~ ~~engaging structures comprising surface projections each~~ projections having at least one forward facing facet directed at least in part toward said leading end and at least one rearward facet directed at least in part toward said trailing end, each of said forward facet and rearward facet having a length and a slope, the length of said forward facet being longer than the length of said rearward facet, the slope of said rearward facet being steeper than the slope of said forward facet, ~~said surface projections having opposed side facets directed generally toward said sides of said implant, said side facets located between said forward facet and said rearward facet of said surface projections, said side facets converging toward each other in a direction away from the base of said projections, said~~ first and second surface projections each ~~rearward facet~~ having an included angle between said rearward facet and the base greater than 90 degrees relative to at least one of said upper and lower surfaces of said implant.

Claims 220-227 (cancelled).

228. (previously presented) The spinal implant of claim 219, wherein said upper and lower surfaces of said implant are at least in part arcuate.

229. (previously presented) The spinal implant of claim 219, wherein at least one of said leading end, trailing end, and sides are curved.

230. (previously presented) The spinal implant of claim 219, wherein said sides are curved.

231. (previously presented) The spinal implant of claim 219, wherein each of said leading end, trailing end, and sides are curved.

232. (previously presented) The spinal implant of claim 231, wherein said leading end, trailing end, and sides form a circle.

233. (previously presented) The spinal implant of claim 219, wherein said upper and lower surfaces of said implant are at least in part planar.

234. (currently amended) The spinal implant of claim 219, wherein said upper and lower surfaces converge toward each other along at least a portion of the length of said implant.

235. (previously presented) The spinal implant of claim 219, wherein said implant comprises a material other than bone.

236. (previously presented) The spinal implant of claim 219, wherein said implant comprises bone.

237. (previously presented) The spinal implant of claim 236, wherein said bone includes cortical bone.

238. (previously presented) The spinal implant of claim 219, wherein said implant comprises bone growth promoting material.

239. (previously presented) The spinal implant of claim 238, wherein said bone growth promoting material is one of bone morphogenetic protein, hydroxyapatite, and genes coding for the production of bone.

240. (previously presented) The spinal implant of claim 219, wherein said implant is treated with a bone growth promoting substance.

241. (previously presented) The spinal implant of claim 219, wherein said implant is a source of osteogenesis.

242. (previously presented) The spinal implant of claim 219, wherein said implant is at least in part bioabsorbable.

243. (previously presented) The spinal implant of claim 219, wherein said implant comprises metal.

244. (previously presented) The spinal implant of claim 243, wherein said metal includes titanium.

245. (previously presented) The spinal implant of claim 219, wherein said implant comprises at least one of a plastic material and a ceramic material.

246. (previously presented) The spinal implant of claim 219, wherein said implant is formed of a porous material and a material that intrinsically participates in the growth of bone from one of the adjacent vertebral bodies to the other of the adjacent vertebral bodies.

247. (previously presented) The spinal implant of claim 219, wherein said implant is a motion preserving device adapted to space apart and allow motion between the adjacent vertebral bodies.

248. (previously presented) The spinal implant of claim 219, wherein said spinal implant is a fusion implant.

249. (currently amended) The spinal implant of claim 248, wherein said upper and lower surfaces include at least one opening to permit bone growth from ~~one of the adjacent vertebral bodybodies to the other one of the adjacent vertebral bodybodies~~ through said implant.

250. (previously presented) The spinal implant of claim 248, wherein said implant has an internal chamber and an access opening for accessing said internal chamber.

251. (currently amended) The spinal implant of claim 250, wherein said upper and lower surfaces include at least one opening in communication with said internal chamber to permit bone growth from ~~one of the adjacent vertebral bodybodies to the other one of the adjacent vertebral bodybodies~~ through said implant.

252. (previously presented) The spinal implant of claim 250, wherein said internal chamber is capable of containing bone growth promoting material.

253. (previously presented) The spinal implant of claim 252, wherein said bone growth promoting material is one of bone morphogenetic protein, hydroxyapatite, and genes coding for the production of bone.

254. (previously presented) The spinal implant of claim 219, further comprising at least one opening capable of retaining fusion promoting materials.

255. (currently amended) The spinal implant of claim 219, wherein said first and second surface projections each have a base, said bases being~~the bases of at least two of said bone engaging structures are adjacent to~~ one another.

Claims 256-258 (cancelled).

259. (new) The spinal implant of claim 1, wherein said first and second surface projections each have opposed side facets directed generally toward said spaced apart sides of said implant, respectively, said side facets being located between said forward facet and said rearward facet of each of said first and second surface projections, said

side facets converging toward each other in a direction away from one of said upper and lower surfaces of said implant.

260. (new) The spinal implant of claim 259, wherein said opposed side facets intersect each other.

261. (new) The spinal implant of claim 260, wherein said opposed side facets converge to form a peak at the top of said surface projection.

262. (new) The spinal implant of claim 261, wherein said peaks of at least two of said surface projections are aligned along lines that are at least one of perpendicular, parallel, and diagonal to the mid-longitudinal axis of said implant.

263. (new) The spinal implant of claim 261, wherein said peak of said first surface projection overlies at least a portion of said second surface projection.

264. (new) The spinal implant of claim 261, wherein said peaks of said first and second surface projections are at the same height above one of said upper and lower surfaces of said implant.

265. (new) The spinal implant of claim 259, wherein adjacent side facets of adjacent surface projections are spaced apart to define a groove therebetween.

266. (new) The spinal implant of claim 259, wherein a plurality of adjacent surface projections are spaced apart to form a plurality of grooves therebetween.

267. (new) The spinal implant of claim 266, wherein at least one of said grooves is parallel to the mid-longitudinal axis of said implant.

268. (new) The spinal implant of claim 266, wherein at least two of said grooves cross each other.

269. (new) The spinal implant of claim 266, wherein at least one of said grooves has a horizontal cross-sectional shape that is one of a v-shape, u-shape, and a box-like shape.

270. (new) The spinal implant of claim 259, wherein each of said first and second surface projections have a base and said side facets have a maximum width therebetween at said base, said base being spaced apart from a base of another of said surface projections by a distance no greater than one-half the maximum width of one of said first and second surface projections.

271. (new) The spinal implant of claim 1, wherein said forward facets of each of said first and second surface projections face the same direction.

272. (new) The spinal implant of claim 131, wherein said first and second surface projections each have opposed side facets directed generally toward said leading and trailing ends, respectively, said side facets being located between said right facet and said left facet of each of said first and second surface projections, said side facets converging toward each other in a direction away from the base of each of said first and second surface projections.

273. (new) The spinal implant of claim 272, wherein adjacent side facets of adjacent surface projections are spaced apart to define a groove therebetween.

274. (new) The spinal implant of claim 272, wherein each of said first and second surface projections have a base and said side facets have a maximum width therebetween at said base, said base being spaced apart from a base of another of said surface projections by a distance no greater than one-half the maximum width of one of said first and second surface projections.

275. (new) The spinal implant of claim 272, wherein said opposed side facets converge to form a peak, said peaks of said first and second surface projections being at the same height above one of said upper and lower surfaces of said implant.

276. (new) The spinal implant of claim 131, wherein said right facets of each of said first and second surface projections face the same direction.

277. (new) The spinal implant of claim 219, wherein said surface projections have opposed side facets directed generally toward said sides of said implant, said side facets being located between said forward facet and said rearward facet of said surface projections, said side facets converging toward each other in a direction away from the base of said first and second projections.

278. (new) The spinal implant of claim 277, wherein said opposed side facets converge to form a peak at the top of each of said surface projections.

279. (new) The spinal implant of claim 278, wherein said peaks are aligned along lines that are at least one of perpendicular, parallel, and diagonal to the mid-longitudinal axis of said implant.

280. (new) The spinal implant of claim 277, wherein adjacent side facets of adjacent surface projections are spaced apart to define a groove therebetween.

281. (new) The spinal implant of claim 277, wherein a plurality of adjacent surface projections are spaced apart to form a plurality of grooves therebetween.

282. (new) The spinal implant of claim 281, wherein at least one of said grooves is parallel to the mid-longitudinal axis of said implant.

283. (new) The spinal implant of claim 281, wherein at least two of said grooves cross each other.

284. (new) The spinal implant of claim 281, wherein at least one of said grooves has a horizontal cross-sectional shape that is one of a v-shape, u-shape, and a box-like shape.
